Question – What is an Electronic Navigational Chart?
Answer – It is a vector– based digital file containing marine features suitable for marine navigation. It is based on the International Hydrographic Organization (IHO) S– 57 standard. The ENC is intended for use in electronic charting systems (ECS) as well as Electronic Chart Display and Information Systems (ECDIS). ENCs can also be used in geographic information systems (GIS) as base map data.

Question – What are ECS and ECDIS?
Answer – Electronic chart systems encompasses any electronic system that uses digital chart data. The chart data can be vector or raster and no specific format is currently defined, although many ECS can use ENC data. There are standards being developed for ECS by the Radio Technical Commission for Maritime Services (RTCM www.rtcm.org). Electronic Chart Display and Information Systems (ECDIS) are systems that are certified to meet a suite of international standards: IHO (www.iho.shom.fr) Transfer Standard for Digital Hydrographic Data S– 57, IHO Specifications for Chart Content and Display aspects of ECDIS S– 52, IMO (www.imo.org) Resolution A.817 (19) Performance Standards for ECDIS, and IEC (www.iec.ch) 61174: ECDIS – Operational and performance requirements, methods of testing and required test results. An ECDIS must use "official" ENC data to meet all of these standards and may use "official" raster data where ENC data is not yet available.

Question – When will ENC be available to the public?
Answer – Creation of the database for producing ENCs takes time and resources. We currently project that the initial coverage of major commercial ports will be completed by 2002. It is anticipated, however, that ENC data will be made publicly available before the entire coverage is complete. We plan to have data available starting in 2001 with updating soon to follow.

Question – What data coverage will be available?
Answer – The nation's 40 major commercial port areas will be completed by the year 2002. This coverage is equivalent to approximately 200 paper nautical charts. NOAA estimates that an additional 400 charts will have to be converted to ENC form for complete coverage of U.S. waters.

Question – How will the public be able to obtain ENCs?
Answer – ENCs will be available for download from the Coast Survey Website (chartmaker.ncd.noaa.gov).

Question – How much does an ENC cost?
Answer – ENCs downloaded directly from the Coast Survey Website will be available free of charge. Private companies may offer ENCs as part of a service, in which case there may be an associated charge.

Question – Is an ENC a simply a copy of the paper chart?
Answer – The NOAA ENC program is building the ENC production database from a combination of charted information as well as original "source" information. NOAA has

compiled critical features such as channel limits, aids to navigation and obstructions from the original documents that were used to put the feature on the paper chart. This means that a feature such as a federally maintained channel was digitized from a 1:2,400 scale drawing as opposed to a 1:20,000 scale chart. The objective is to use more accurate information for features that are critical to the safety of navigation.

Question – What are the sources used in compiling ENCs?
Answer – NOAA uses a number of sources in compiling ENCs. These include: U.S. Army Corps of Engineers surveys, drawings and permits, U.S. Coast Guard Local Notices to Mariners, National Imagery and Mapping Agency Notices to Mariners, NOAA hydrographic surveys, the largest scale paper chart of the area, as well as other source material that comes in to NOAA from a variety of public and private sources.

Question – Does the ENC have all of the features from the chart?
Answer – The NOAA ENC will contain most of the features currently shown on the corresponding paper chart. The detailed road networks and depictions of buildings in urban areas will be replaced with an "urban area" that is displayed as a tinted area with the associated place name. Some of the earlier ENCs that NOAA produced have limited content and are intended for deep draft navigation only as they do not have many of the alongshore features found on a paper chart. These ENCs are referred to as "Version 1."

The Version 1 ENCs are being upgraded so that the entire NOAA ENC suite will contain all of the features available on the paper chart.

Question – What ENC data is currently available?
Answer – Approximately 20 ENCs will be available for evaluation, familiarization, testing and software development from the Coast Survey Website (chartmaker.ncd.noaa.gov).

Question – How current is the ENC?
Answer – All ENCs that are considered "completed" are up to date for the current Notices to Mariners. They will also have any new chart information included within a few weeks of the information's arrival at NOAA.

Question – Is ENC data copyrighted by NOAA?
Answer – No.

Question – Do ENCs enhance marine navigation and will they replace the paper chart completely?
Answer – ENCs and RNCs will eventually replace paper charts for vessels using electronic navigation. NOAA will continue to produce paper charts for those users who do not choose to use electronic navigation. ENCs and ECS are the greatest advancement in maritime safety since the introduction of radar to ships.

Question – How often will new editions of ENCs be released?

Answer – This is yet to be determined. In paper chart production, new editions are driven by the amount of new information to be applied to the chart as well as how many copies are in stock for use. Neither of these considerations really apply to the ENC, so new ENC editions may be synchronized to the paper chart cycle or may be on a set schedule, e.g., annually released.

Question – What is meant by an ENC "cell"?
Answer – The area covered by an ENC is referred to as a "cell." At present, each ENC corresponds to the largest scale paper chart in a given area. As the ENC begins to contain more detail and the file sizes get larger, it may become necessary to split the cells into smaller areas.

Question – On what media will ENCs be available?
Answer – Coast Survey will not provide ENCs on any hard media, they will be only available from the Government at the Coast Survey Website (chartmaker.ncd.noaa.gov). However, private companies may make NOAA ENCs available on products that are available on hard media.

Question – What hardware and software is required operate ENCs?
Answer – Display of and ENC is dependent on navigation software such as an ECDIS. However, the ENC is not dependent on unique operating systems or navigation software. Since it is provided in an international, publicly available standard format, any software company that wants to support ENC data can implement that capability without restricting the software to a proprietary format or provider.

Question – Can commercial systems operate and view ENC data?
Answer – Yes. A number of commercially available systems use ENC data. These include both "type– approved" ECDIS software as well as ECS packages.

uestion – Will NOAA provide any viewing or navigation software?
Answer – No. NOAA is providing the ENC data. It is up to the commercial market to provide software to use it.

Question – What are the uses of ENCs?
Answer – Marine navigation, route planning, and GIS applications are just some the uses for the data as a background display. USCG already uses ENC in several Vessel Traffic Systems (VTS) to monitor ship movements in rivers, harbor, and bays in the U.S. Since ENC is a vector product, categories of data may be individually selected or queried. Because of this data flexibility, ENC is a powerful database supporting various marine and GIS applications.

Question – What are the benefits of using ENCs?
Answer – Incorporating digital chart data with a continuous GPS signal for automated vessel positioning enhances safety of navigation. Users can selectively display only the information desired while the computer can continue to process all the information for safety of navigation. Many marine mishaps are due to human error. Vector chart data

with proper software applications will enhance safe navigation and provide the mariner with advance electronic warnings of unforeseen dangers.

Question – What capabilities does ENC provide that are not available in a paper or raster chart?
Answer – Data can be queried (i.e., vector data is smart data) in a variety of ways, which gives the user much more information than a static paper chart can. The navigator can control the display of the ENC data, which allows for a customized display that only shows information critical to safe navigation. The navigation system software can continuously monitor the ship's position relative to all of the features contained in the ENC, whether displayed or not, and sound alarms if it detects a hazardous situation. Similarly, the software can check that planned routes will provide safe passage for the vessel by checking for proximity to dangers and crossing areas with insufficient depth.

Question – How is the data displayed?
Answer – This depends entirely on the navigation software or GIS that is being used. An ECDIS will use the symbols and colors required by regulation, but other systems can use whatever symbols the manufacturer chooses.

Question – Does the data look like a paper chart?
Answer – It can, depending on what colors and symbols the display software is using.

Question – Will ENCs be updated via the US Coast Guard Local Notice to Mariners?
Answer – Yes. NOAA plans to provide updates for the ENC similar to the updates currently provided for the raster chart. These will include all Local Notices to Mariners corrections.

Question – Can a user get a screen print of any displays?
Answer – Depends on the software being used. Most PC platforms support screen prints.

Question – Can a display be used without GPS input?
Answer – Yes, but the ideal navigational situation is to have an automated positioning signal feed into the system displaying ENC data for continuous vessel tracking.

Question – On a ship that transits from one ENC to another ENC, can both areas be simultaneously shown in a single display?
A– It all depends on the customer's system capability; nothing in the database precludes this capability.

Question – Can other ships navigating in the ships area also appear in the ENC display?
Answer – This depends on the customer electronic navigation systems – nothing in the data precludes display of the data from ship's radar screen or, when adopted, Automated Information System symbology.

Question – How will ENCs be updated and maintained?

Answer – ENCs will be updated with new source material and Notices to Mariners (both Local and NIMA). The ENC production system will be able to convert any new source materials such as hydrographic surveys, Notices to Mariners, etc. for inclusion in the ENC database.